Neurotransmitter Specific Roles in the Basolateral Amygdala and Their Effect on Ethanol-Seeking and Intake

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Relapse is a major problem in alcoholism treatment. Environmental cues can act as triggers that can reinstate alcohol use. By understanding specific neurochemical processes in the brain we can develop new treatments which will be focused on relapse prevention. Specifically the basolateral amygdala (BLA) which is involved in motivated responding and cue-induced reinstatement is of key interest. The aim of this study was to dissect drinking behaviors in an animal model (Long Evans rats) into two parts: appetitive (related to cue-induced reinstatement) and consummatory (related to primary reinforcement). Using operant chambers, lever pressing was a measure of an appetitive response and intake measured consummatory response. We looked at involvement of specific neurotransmitters in the BLA via microinjections of a dopamine and a glutamate antagonist. After initial lever press training, the rats received weekly microinjections of the two drugs as well as artificial cerebrospinal fluid in a randomized order to study their effects on ethanol (n = 5-8/group) and sucrose (n = 6-11/group) responding. Preliminary findings suggest both neurotransmitter- and behavior- specific effects. That is, manipulations of the BLA do not affect the intake of either sucrose or ethanol. This is consistent with findings suggesting that this area is not involved in processing primary reinforcement. However, the administration of the glutamate antagonist (but not the dopamine antagonist) in the BLA had a tendency to decrease reinforcer-seeking at the highest dose ($p<0.09$). This effect was not reinforcer specific, suggesting that the BLA glutamate activity may be involved in reinforcer-seeking rather than specifically in ethanol-seeking. Overall, the findings of this study will provide new insight into neurotransmitter function in the BLA, its relationship to alcohol intake, and will hopefully drive future research into development of new drugs that will reduce alcohol cravings and chance of relapse.

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